Patent Claims

1. Method of, during the first part of loading in the loading of artillery pieces which are loaded with the components for loading in the form of shells (1) and propellant powder charges separately, accelerating the component with which the piece is to be loaded to a sufficiently high velocity that the respective component can, during the second, concluding part of the loading operation, cover the final distance in the barrel of the piece up to ramming therein in its own free movement, characterized in that the respective component (1) is accelerated to the necessary ramming velocity using an electromechanically generated energy supply in the form of the starting acceleration from an electric motor (2), the rotating starting acceleration of which is mechanically converted into rectilinear acceleration.

2. Method according to Claim 1, characterized in that the intended component for loading (1) is accelerated to the desired ramming velocity by an electromechanically generated first energy supply acting linearly in the loading direction combined with a second energy supply released simultaneously in the same direction, which has been accumulated previously in an energy accumulator (7, 7a-d).

3. Method according to Claim 1 or 2, characterized in that said accumulated second energy supply is obtained from at least one spring means (7, 7a-d) compressed at an earlier stage.

4. Method according to Claim 1, 2 or 3, characterized in that the electric motor (2) which is used for generating the electromechanically generated first energy supply is, after the loading operation has been completed, used to supply new accumulated energy to the energy accumulator (7, 7a-d) again in the form of tensioned spring energy or the like.

5. Arrangement for, in accordance with the method according to one of Patent Claims 1-4, during the first part of the loading operation in the loading of artillery pieces, accelerating the component with which the piece is to be loaded, such as a shell (1) or one or more propellant powder charges, to a sufficiently high velocity that the component can, during the second, concluding part of the loading operation, cover the final distance in the barrel of the piece up to ramming in its own free movement, characterized in that the energy generator used for generating this acceleration consists of an electric motor (2), the rotating starting acceleration of which is mechanically converted into the desired linear acceleration movement with which the component is accelerated to the desired ramming velocity.

6. Arrangement according to Claim 5, characterized in that it comprises on the one hand an electromechanical system (2, 2a, 4-11) for generating a first linear energy supply in the loading direction and on the other hand an energy accumulator (7, 7a-d) in which it is possible for a linear second energy supply which can be released in the same direction to have been accumulated in advance, said electromechanical system for generating the first energy supply being connected to said energy accumulator in such a manner that, when the generation of the first energy supply starts, the second is also released, and the interacting energy supplies acting together on a rammer (6, 6a-d) which bears against the component (1) to be rammed.

7. Arrangement according to Claim 6, characterized in that said electromechanical system (2, 2a, 4-11) for developing the first energy supply comprises a geared-down electric motor (2) combined with a mechanical means (2a, 4-11) for converting the rotating starting acceleration of the motor (2) into a linear accelerating movement.

8. Arrangement according to Claim 6 or 7, characterized in that said mechanical means for

converting the rotating starting acceleration of the electric motor into a linear accelerating movement consists of a first feed chain (4) which runs in a closed loop in the desired acceleration direction of the component for loading around on the one hand a first chain wheel (3) connected firmly to the output shaft of the motor (2) and on the other hand a second chain wheel (5) arranged in the running direction of the feed chain (4), while the energy accumulator (7, 7a) is coupled to a second feed chain (9) which, in a closed loop, runs parallel to the first feed chain around two chain wheels (10, 11), one of which is mounted firmly on the same spindle as the second chain wheel (5) of the first feed chain, these two last-mentioned chain wheels (11, 5) rotating and driving in the same direction when they are acted on via the motor and, respectively, the energy accumulator, while the shell rammer (6) is connected to and driven by said first feed chain.

9. Arrangement according to Claims 5-8, characterized in that the energy accumulator (7, 7a-d) consists of a spring means in the form of a pneumatic or coil spring, the movement of the two feed chains in one direction, activated by the motor, bringing about an accumulation of energy by stressing the spring means at the same time as a return of the shell rammer (6) to a starting position, while a movement in the opposite direction brings about an acceleration of the shell rammer and the component for loading (1) in question, while energy is supplied from both the motor (2) and the energy accumulator (7, 7a).

10. Arrangement according to Claims 5-7, characterized in that it comprises a feed chain (4a) which runs around two chain wheels (3a, 5a) in a closed loop and is driven by an electric motor (2) via one of the chain wheels (3a), while a planetary gear (13) is connected to the other chain wheel (5a) of the feed chain (4), which chain wheel can be, depending on the circumstances, either driven by or driving relative to

the feed chain, while the output shaft of the planetary gear is connected to a crank arm (14), at the outer end of which, fixed between the latter and a fixed point (16), a spring means (7b) in the form of a pneumatic or coil spring is arranged, while a shell rammer (6a) is connected to the feed chain (4a).

11. Arrangement according to Claim 10, characterized in that a full stroke length for the spring means corresponds to half a revolution of the output shaft of the planetary gear (13) and the crank arm (14) fixed to the end of the shaft, the arm having a starting position which corresponds to the starting position of the shell (1), in which it keeps the energy accumulator (7b) compressed and in which the crank arm forms a certain angle with the connecting line through the fixed fastening point (16) of the energy accumulator (7b) and the output shaft (13a) of the planetary gear, and a stopping position which corresponds to the stopping position of the shell rammer (6b) and involves a relatively small prestressing of the energy accumulator brought about by utilizing the braking energy released on braking of the shell rammer (6a) after acceleration of the component for loading in question has been completed.

12. Arrangement according to one of Claims 10 or 11, characterized in that the electric motor (2) and systems connected to it can be driven in optional directions either for acceleration of the shell or for charging the energy accumulator.

13. Arrangement according to Claim 11 or 12, characterized in that the feed chain (4) also bears, in addition to the shell rammer (6b), a stop (17) for braking shells (1) supplied to the arrangement, the energy supplied to the stop (17) during braking of the respective shell (1) being utilized to drive the planetary gear (13) in a direction which at least to an extent brings about charging of the energy accumulator (7b), while the charging of the same is completed by the electric motor (2).

14. Arrangement according to Claim 6, characterized in that said mechanical means for converting the rotating starting acceleration of the electric motor (2) into linear acceleration consists of a pinion (19, 20, 23, 25) which is driven by the motor (2) and bears against a first rack (18) connected to the shell rammer, while the energy accumulator comprises a spring means and a second rack (22) which can be displaced relative to the rest of the system by the spring means when the latter is activated and which in turn is also connected to the drive shaft (2) of the electric motor (2) via pinions (23, 25, 19).

15. Arrangement according to Claim 6, characterized in that said mechanical means for converting the rotating acceleration of the electric motor (2) into linear movement consists of a pinion (27) which is mounted on the output shaft of the motor and, via a rack (28) forming part thereof, drives a displaceable frame (29), said frame (29) in turn bearing a feed chain (34) which runs around two chain wheels (32, 33) in a closed loop and which is connected on the one hand, in one of its parallel-running portions, to the body (30) in which the frame (29) is displaceable and on the other hand, in its other portion, to the shell rammer (6d), while at least one energy accumulator (37a, 37b) is fixed between the fixed body (31) and the displaceable frame (29).

16. Arrangement according to one of Claims 5-15, characterized in that it comprises members which start the release of the energy supply from the energy accumulator at the same time as the electric motor is started.

17. Arrangement according to one of Claims 5-16, characterized in that it comprises members for loading the electric motor (2) in a direction which brakes the triggering of the energy accumulators until the time of ramming when the current direction to the motor is switched.